

Research and Development on Ultimate Hoops

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Abstract

With the development of computer technology, it promotes the growth of a range of related industries. Mobile phone is very popular in our society, and the trend that more people will play 3d game in mobile phone is more obvious. This paper presents the design and implementation of a navigation system into an Ultimate Hoops game created using Unity3D game engine with the goal of improving the usability and user experience, reducing the development threshold of the device application program of the action by way of vision innovated.

Keywords

Unity3D; Ultimate Hoops

Introduction

Modern mobile phones like small computers, with limited processing power, are one of the most powerful compact devices available for mobile computing purposes. A recent study carried out by ITU (International Telecommunication Union) shows that by the end of 2008, mobile penetration has almost reached 50 percent; about 4 billion mobile subscribers worldwide while ten years ago it was close to zero and the number is growing annually. This indicates that mobile phone is one of the most widespread devices available today. Nokia launched its first mobile phone game Snake, which has penetrated into our lives with an amazing and stunning speed. Mobile phone games featured with short and easy are one of the fastest growing segments of the game industry. Recent advancements in mobile games include single player, multiplayer and 3D graphics. With the advent of new mobile phones with network connectivity capabilities, multiplayer games quickly attract users' attention, taking advantage of the capability to play with other players. Primarily geared for voice data, mobile phones can send and receive other kinds of data as well. This ability to share information offers an opportunity to design games where players can interact with others. With the development of

intelligent mobile phone with high performance, the proportion of 3D mobile phone game is increasing in mobile phone game. The 3D mobile phone game development can use the underlying OpenGL like general 3D game development, it will be more difficulty during the development and the workload is heavier. So the designers solve this problem usually by using a 3D engine.

The hardware performance improves advancement cell phone game experiences, and the cell phone game becomes the populace focus. The success of Angry Birds is a significant milestone. iPhone application software that the body sells well most for 2010, this game App Store in 69 countries employs ranking the first in the shop. When its first anniversary, this game has sold 13 million sets in the iOS platform, in addition other Android and various free versions, the total downloads already over 50 million times.

Unity3D, a popular 3D game engine in recent years, particularly suitable for independent game developers and small teams; mainly comprises eight products such as the Unity, Unity Pro, Asset Server, iOS, iOS Pro, Android and Android Pro. Without writing complex codes, programmers can quickly develop a scene by using the visual integrated development environment of Unity3D. In the popular iPhone game list, the games developed by Unity3D take a large proportion, such as Plants vs. Zombies, Ravens word: The Fallen King. In particular, Unity3D also provides the Union and Asset Store selling platforms for game developers. Unity3D has special advantages in easily programming a game. For example, platform-related operations are encapsulated in its internal, the complex game object-relations are managed by different visual views, and JavaScript, C # or Boo scripting languages are applied to program a game. A script program will be automatically compiled into a .NET DLL file, so the three scripting languages, in essence, have the same performance, in addition their

execution speed is 20 times faster than traditional JavaScript. These script languages have good cross platform ability as well. That means developers can deploy games on different platforms such as Windows, Mac, Xbox 360, PlayStation 3, Wii, iPad, iPhone and Android. In addition, games can run on the Web by installing a plug-in.

This paper focuses on Unity 3D game engine technology and its developing instrument development application analysis on in the mobile phone game, reducing the development threshold of the device application program of the action by way of vision innovated to develop a "Ultimate Hoops" inter-dynamic mobile phone game. The realization of this system will help the game developer of the mobile phone to combine with the game operator of the mobile phone better, thus holding more businesses opportunity.

Mobile Phone Game Design Method

Ultimate Hoops Inter-dynamic 3D Mobile Phone Game Frame

The frame of the game procedure actually just points the engine of the game. The engine of the game is used for controlling the main program of all game functions, from calculating the relative positions of colliding, physical system and object, get and import of the player, and export sound, etc. according to correct volume. After the game frame is typed well, mean the completion of the engine of the game, the completion of the engine of the game means the whole game is basically shaped. The structure of the engine of the game has nothing in common with each other, but basically realize in a game is mainly gone back to enclose. Figure 1 is the basic game frame diagram of Ultimate Hoops.

Game Making and Released

Use The Ultimate Hoops game creates a basic mini-game in which a basket moves around the screen and the player controls three characters trying to shoot a basketball. The concepts were about basic game structure, triggering animations, the input class, and collision, instantiation, using GUI for game feedback and menu buttons, and utilizing power-ups. The game built by adding levels, challenges, more power-ups, or by using custom art assets and taking it in your own direction.

The importance of the original image is worth emphasizing, in order to guarantee that it can be later

correctly exported together with its texture to the game engine that will be used in the game development. Before exporting the geometric model to Unity engine, the game engine used in this work to natively import Blender files, we designed and implemented the computer animation of the propeller of the player.

The key frame technique is regarded as a good example of an agile method that can help mobile game developers deliver better games faster. Also, to make easy the process of definition of the sets of spatial key frames of the character, a structure of armature, in other words is created, a sort of skeleton of the player. This skeleton consists of bones that help the handling of the 3D object during the animation development.

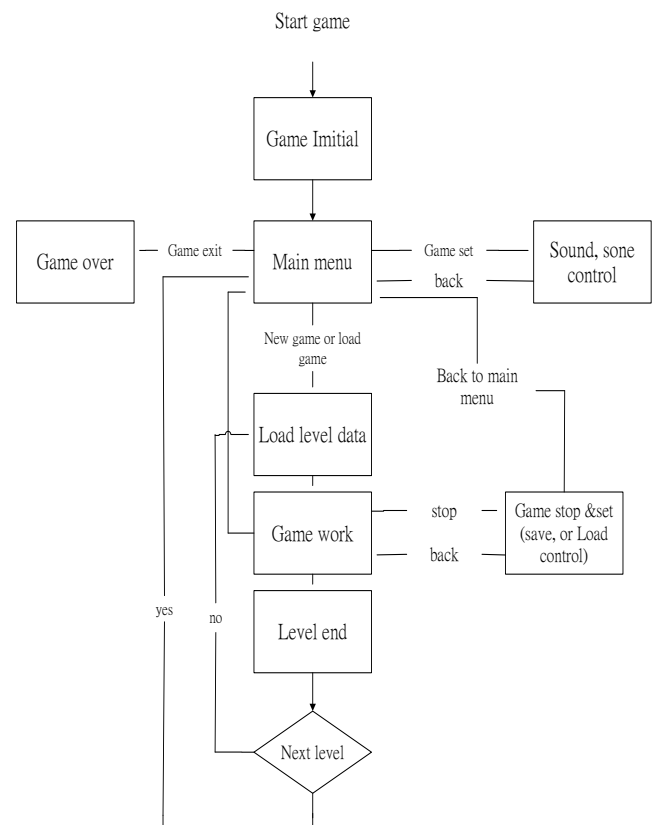


FIG. 1 THE BASIC GAME FRAME DIAGRAM

Game Programming

As previously mentioned, for the Ultimate Hoops project, we chose Unity: an integrated authoring tool for creating interactive content such as games and real-time 3D animations. The editor runs on Windows and Mac OS X and can produce games for Windows, Mac, Web browsers, Wii, iOS (iPhone, iPod, Touch, and iPad), Android, Xbox 360, and PlayStation 3. Since Unity can export the same game to several platforms,

the developer also saves time during this phase. Another strong and positive point we have identified using Unity as game developers is a quite productive form of system development offered by its editor “What You See Is What You Get”, very useful for fast prototyping and iteration. The setup step is as follows:

- (a). Main menu setup: Creating game with a menu from which it can load the rest of the game content. GUI Buttons and the Build Settings window (implement your own editor GUI here in Fig. 2).

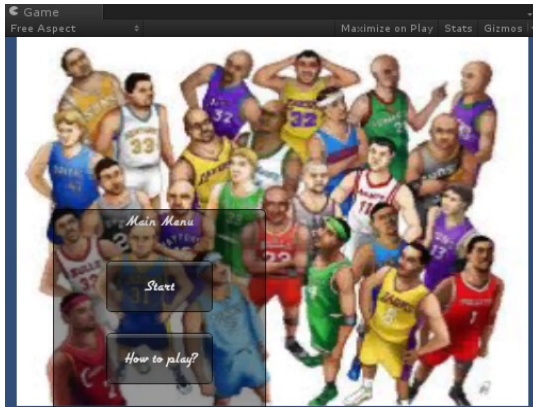


FIG. 2 MAIN MENU.

- (b). Importing assets: 3D model data including a basketball court, a ball, and a player import to Unity 3D.
- (c). Scene setup: Set up the level elements for the basketball game. Placing the court, the players, and the basket into scene, and setting the hoop to move back and forth across the court. Moves the transformation in the direction and distance of translation, if the scene relatives to Space.Self the movement is applied relative to the transform's local axes. (The x, y and z axes shown when the object is selected inside the Scene View.) If the scene relatives to Space.World the movement is applied relative to the world coordinate system, as shown in Figure 3.

```
function Update () {
    if(goOtherDirection)
    {
        this.transform.Translate(Vector3(-1, 0, 0) * Time.deltaTime * speed, Space.World);
    }
    else
        this.transform.Translate(Vector3(1, 0, 0) * Time.deltaTime * speed, Space.World);

    if(this.transform.position.x > 2)
        goOtherDirection = true;
    else if (this.transform.position.x < -2)
        goOtherDirection = false;
}
```

FIG. 3. SCRIPT FOR THE HOOP MOVING BACK AND FORTH ACROSS THE COURT.

- (d). Character control: Set up the framework instantiate basketballs in the correct positions and animate the player models to set up a shot upon user input. Return true message during the frame pressed down the virtual button identified by button name, as shown in Figure 4. You need to call this function from the Update function, since the state gets reset each frame. It will not return true until the user has released the key and pressed it again. Figure 5 is the player-control picture of Ultimate Hoops.

```
function Update() {
    if(Input.GetButtonDown("Player") && canControl) {
        player.animation.PlayQueued("aim");
    }
    else if(Input.GetButtonUp("Player") && canControl) {
        player.animation.PlayQueued("fire");
        ball.transform.parent = null;
        ball.useGravity = true;
        ball.velocity = transform.TransformDirection(0, yVel, zVel);
        MakeBall1(pos[0]);
        DestroyBall(ball);
        canControl = false;
        player1.animation.PlayQueued("idle");
    }
}
```

FIG. 4 SCRIPT FOR THE PLAYER CONTROL OF “INPUT.GETBUTTON.DOWN”.



FIG.5. THE PLAYER-CONTROL PICTURE OF ULTIMATE HOOPS.

- (e). Scoring system setup: Once a ball is thrown into a basket, it needs to detect the player's success in doing so and increase the player's score.
- (f). New ball script: After the basketball was in the correct positions, it can animate the players to shoot the ball and then apply proper force to launch it towards the basket. OnTriggerEnter is called when the Collider other enters the trigger. This message is sent to the trigger collider and the Rigidbody (or the collider if there is no Rigidbody) that touches the trigger, as shown in Figure 6. Note that trigger events are only sent if one of the colliders also has a Rigidbody attached.

```
function OnTriggerEnter(other :Collider){
    if(other.gameObject.name == "Flameball(Clone)")
    {
        count = 0;
        Score.score += 5;
        other.gameObject.name = "Dead Ball";
        this.audio.PlayOneShot(net);
    }
    else if (other.gameObject.name == "Basketball (Clone)") {
        if(!running)
            StartTimer();
        count++;
        Score.score++;
        other.gameObject.name = "Dead Ball";
        this.audio.PlayOneShot(net);
        audio.volume = .2;
    }
}
```

FIG. 6 SCRIPT FOR THE BASKETBALL OF "ONTRIGGERENTER".

- (g). Ball physics: It needs to make some changes to the ball's physics behavior to create a better gaming experience, such as modifying its bounciness and the force applied upon shooting.
- (h). Flame ball: It adds an extra bonus for the player by making the ball catch fire after they make enough baskets in a row. The flame ball also adds more points per basket. It will use an ellipsoid particle system to create the fire effect. Figure 7 is the picture of the flame ball.



FIG. 7 THE FLAME BALL PICTURE.

- (i). GUI skin: Adding visual feedback to the game by displaying the score, and also by creating buttons for the Main Menu. The global skin is used. You can set this at any point to change the look of your GUI. If you set it to null, the skin will revert to the default Unity skin.
- (j). Next level setup: At this point, the game only has one level, so it needs to end the level after a timer runs out, and then load another level, and also add GUI labels and buttons to facilitate this. Make a single press button, as shown in Figure 8. The player clicks the icon and next level scene happens immediately.

```
function OnGUI(){
    GUI.skin = customSkin;
    GUI.BeginGroup(Rect(Screen.width / 10, Screen.height / 2.5, 200, 200));
    GUI.Box(Rect(0,0, 200,200), "Round Over");
    GUI.Label(Rect(40,40,200,50), "Your total score is " + Score.score.ToString());

    if(GUI.Button(Rect(50,80,100,50), nextLevel)){
        Application.LoadLevel(nextLevel);
    }
    if(GUI.Button(Rect(50,140, 100,50), "Quit")){
        Application.Quit();
    }
    GUI.EndGroup();
}
```

FIG.8 SCRIPT FOR NEXT LEVEL OF "GUI.SKIN".

- (k). Menu background: Adding a little visual variation to the game, and we'll take a screenshot and turn it into a loading menu background.
- (l). Game sounds: Sound is a critical part of game design. It adds some basic sound effects for the player shooting, missing, and swishing.
- (m). To draw the HUD (Heads-Up Display) of the battery icon, that is, to create the method by which information is visually relayed to the player as part of Ultimate Hoops user interface, and a script is added in the camera.
- (n). Ultimate Hoops released and test.

Results and Discuss

In the game area, the creation and development process is formed by a pipeline, from the 2D material up to the creation of the final product. Our general sense of Ultimate Hoops is that the core game mechanics worked effectively and were engaging in different mobile platforms: iPhone 3G, iPhone 3GS, iPhone 4, and iPad. However, it was observed that the iPhone 3G's performance is inferior to that of other device models, probably due to its lower processing capacity. The use of a graphic engine such as Unity increased considerably productivity in terms of game development, mainly due to its visual editor, and the possibility to export the game to several other mobile platforms.

Further, if we make just small code adjustments, Unity can also be used to simplify the task of porting a mobile game and executed on a browser (e.g., Firefox, Chrome, IE, Safari), or even to create an executable file for desktop computer platforms, such as Mac OS and Windows. Therefore, it is believed that Unity does not require much effort to work with multiple platforms. Actually, for porting a mobile game to a new platform, the biggest difficulty would be related to the input interface, since the types of commands for game

control vary considerably (keyboards, touch screen, accelerometer, etc.). As regards desktop computers and mobile devices, it can be anticipated that it would be necessary to implement a transparent layer to modify or adapt the input form, or even to replace the original code of the keyboard entry with a new one that supports touch screen and accelerometer.

Although it is simple and easy to learn and understand, Ultimate Hoops is still challenging to be mastered overall. Players had to score as many points as possible, requiring playing at speed. Consequently, gameplay vary with different age groups. In general, the user experience is very satisfactory and the Ultimate Hoops is well accepted. Users have fun when playing against other players, especially when they get into situations that required an immediate action to get more coins.

The object of the game is to shoot and score the basketball into the hoop as many times as you can while the basketball net moves left and right. The game will continue for two levels which will increase the shoot distance. Playing the game simply touches the player picture to shoot the balls at the right time. Figure 9 and Figure 10 are the game screen pictures.



FIG. 9 GAME SCREEN PICTURE.

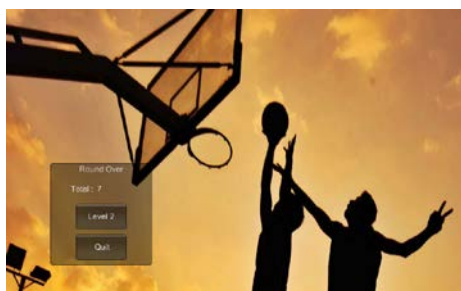


FIG. 10 "NEXT LEVELL" GAME SCREEN PICTURE

Conclusion

This paper has analyses and researched the foundations of Unity 3D technology and developing instrument, environment, developed the design of an Ultimate Hoops inter-dynamic mobile phone game and the whole course, in addition, the description on the details of relevant technical design has been made.

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